



Year 2000



Progress Report of Activities

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Arizona, Tucson Plant Materials Center

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Who We Are

The Tucson Plant Materials Center (PMC) is a branch of the United States Department of Agriculture, Natural Resources Conservation Service (NRCS). It is one of 26 Plant Materials Centers located throughout the United States. The Tucson PMC began operations in 1935. The evaluation of plants as well as cultural and management practices are carried out at the federally owned 45.5-acre farm as well as off-center evaluation sites. The Center was officially listed on the National Register of Historic Places in 1997. It is the first PMC to be so recognized. The Tucson PMC serves areas located in the Sonoran, Mohave, and parts of the Chihuahuan deserts located in Arizona, southeastern California, southern Nevada, southern Utah, and southwestern New Mexico. The Tucson PMC is located in northwest Tucson, just east of Interstate 10, on Romero Road just south of Prince Road.

What We Do

The mission of the Tucson PMC is to provide quality vegetative solutions to conservation problems. The Tucson PMC conducts various studies and plantings and participates in various cooperative efforts to address an array resource issues in the following areas:

1. Rangeland
2. Mined Land
3. Urban Lands
4. Cropland
5. Riparian Areas

The Tucson PMC actively provides technical assistance to NRCS Field Offices and Resource Conservation and Development (RC&D) groups. Conservation districts, federal and state agencies, and private landowners also cooperate in these efforts. This interagency cooperation offers many opportunities for joint development and release of plant materials as well as for exchange of information, seed, and planting stock.

A brief summary of year 2000 accomplishments follows. To receive more detailed information on specific projects request a copy of the 2000 Annual Technical Report from the address or website listed above.

Arizona Cottontop Released For Commercial Production In 2000

Plant materials evaluations at the Tucson PMC have focused primarily on native species for the past 10 years. The primary uses for these indigenous species are intended for critical area stabilization, roadside beautification, rangeland revegetation, and abandoned cropland revegetation. Arizona cottontop is a native, perennial bunchgrass that contributes considerable range forage in the Southwest. This species can be found in the oak woodland, chaparral,



and semidesert grassland vegetation types in Arizona at elevations between 300 and 1,800 m. 'Loetta' was selected for release in 2000 because of its overall vigor, seed production, and forage production. Arizona cottontop has beneficial qualities in terms of diet for wildlife species including pronghorn antelope, mule deer, desert cottontail, whitethroat woodrat, javalina, and scaled quail. The Tucson PMC recommends that 'Loetta' be utilized as part of a seeding mixture comprising approximately 15-30% of the total seed mix; however the percent composition may vary depending on the seeding objective. Site characteristics and condition influence the components of a seeding mixture. Arizona cottontop does have several characteristics that allow it to tolerate severe climatic conditions or use. This species can be successfully reseeded on upland areas receiving at least 28 cm of annual precipitation; it is moderately affected by fires, and is highly flexible in its adaptability to management strategies provided grazing intensity is held below 60%. Light summer use 2 years out of 3 is recommended to maintain optimum vigor while at the same time stimulating axillary sprouting to increase productivity.

Developing Native Plant Materials To Address Resource Concerns

Native species are in demand to address such concerns as wildfire rehabilitation plantings, wildlife habitat improvement projects, critical area stabilization and mined land revegetation efforts. The primary goal for revegetating overburden and

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mine processed materials at copper mine operations is to stabilize the slopes to prevent erosion and to blend these man-made slopes with the surrounding undisturbed areas. The successful establishment of native plant materials on these sites promotes the utilization of these areas as territorial and forage locations for native wildlife species.

Two species native to the southwestern U.S. have been



evaluated at the Tucson PMC for their use in critical area and rangeland revegetation efforts are set to be released in 2001:

- Cane bluestem (*Bothriochloa barbinodis*)
- Desert saltbush (*Atriplex polycarpa*)

Using traditional methods, the development of a proven cultivar can take from 15 to 20

years. The Tucson PMC has been working with the University of Arizona, School of Renewable Natural Resources to develop a plant development procedure that will greatly reduce this process. Convergent-Divergent Improvement (CDI) is a process originally developed by corn breeders in the midwestern U.S. that has been modified to better meet the plant development needs at the Tucson PMC. This process can take as little as 5 years to develop and release a proven species or plant population for commercial production and use. Two species currently under development using the CDI process at the Tucson PMC are:

- Spike dropseed (*Sporobolus contractus*)
- Pima pappusgrass (*Pappophorum vaginatum*)

In addition to native plant development, studies have been or are currently being conducted to develop information on successful stand establishment and management, seed dormancy, seed harvesting and processing, and fertility practices to enhance viable seed production.

Cover Crop Evaluations To Optimize Soil And Water Protection

The Tucson PMC is evaluating studies and activities to determine cover crops, cropping systems, and residue management practices to optimize soil and water protection, food and fiber production, and economic returns. The objective of these studies is to identify and develop legumes having minimal water requirements for use as cover crops during summer fallow periods in northwestern Arizona and during winter fallow periods in southern Arizona. The Tucson PMC is working to document and promote the benefits of using cover crops and green manure crops in cropping rotations. The Cover Crop and Green Manure practice, when implemented, will protect air quality by reducing wind erosion, improve soil tilth, improve soil moisture holding capacity, and reduce soil nutrient loss.

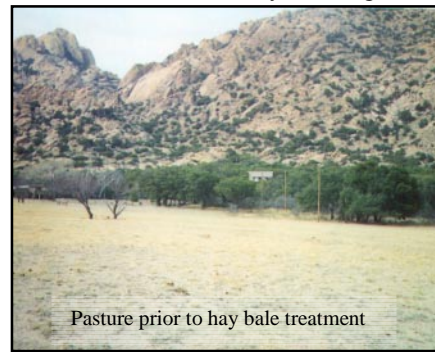
Native Grass Hay Bales Produce Positive Results

Beginning in 1995 the Tucson PMC began baling and storing native grass hay from its seed production fields. This practice was initiated due to an excessive accumulation of biomass in

the PMC seed production fields following rotary mowing at the end of the harvesting season. The arid climate in the southwestern U.S. is not conducive to rapid breakdown of organic material, the excessive biomass in the production fields hampered field cultivation and was beginning to depress plant growth and reduce seed production.

The Maggie Tank native grass hay bale project was initiated in cooperation with the Cochise County University of Arizona Cooperative Extension Service, Bureau of Land Management (BLM) and the Tucson PMC. The project is located on private land within the Sheep Canyon grazing allotment in Cochise County, Arizona. The project was designed to facilitate revegetation of deteriorated rangeland. Some natural revegetation had been occurring on the allotment however there were areas that were not showing any significant response to improved grazing management. The intention is to use livestock as a tool to plant grass seed through trampling in the area where the hay bale material was distributed. The practice of livestock trampling to incorporate seed into the soil is a technique in rangeland revegetation first recommended in the early 1950's. Native grass hay is similar to conventional straw and can be applied at the same rates as straw mulch. If properly cut and dried, native grass hay stems are longer and stronger than grain straw. The use of this type of material in revegetation efforts can aid in the establishment of a diverse native plant community. Despite lower than average annual precipitation at the Maggie Tank site, this planting has resulted in the successful establishment of grasses within the test plots.

Native grass hay bales supplied by the Tucson PMC have also been utilized on a variety of revegetation projects in



Pasture prior to hay bale treatment



One year following hay bale treatment

cooperation with the Malpai Borderlands Group, U.S. Forest Service, and the NRCS Douglas Field Office located in southeastern Cochise County, Arizona. These projects revealed that in the areas where native grass hay bales were scattered and livestock were used to incorporate the material into the soil, excellent stands of grass had become established. In addition to scattering the hay bale material, bales were

also used to construct small check dams to spread surface water runoff and increase infiltration.

Watershed Improvement Studies and Evaluations Aimed At Reducing Sedimentation And Improving Water Quality

The Tucson PMC has provided technical assistance to field offices and the Coronado RC&D on two watershed protection projects. One of these projects is located along the Gila River near Safford in southeastern Arizona. This project is intended to improve water quality by reducing sediment, a non-point source pollutant of off grazing lands in the Whitlock Valley.

A series of small sediment retention structures were constructed in the watershed to retain sediment, reduce the surface runoff rate allowing more vegetation to become



established, increase duration of channel flow, improve groundwater recharge, enhance wildlife habitat, and provide discharge to the San Simon-Gila River system that has a significantly lower amount of turbidity. The

Tucson PMC works closely with the Safford Field Office to collect data and monitor the vegetative changes created by the installation of the structures.

The second project is located in an upland area above the San Pedro River near Tombstone in southeastern Arizona. The purpose of this project is to improve the quality of surface water quality by reducing sediment that is a non-point source pollutant of nearly 6,000 acres of rangeland. The project site is located within two pastures that had been over utilized over the past 100 years. Over time, the area became severely eroded by sheet, rill, and gully erosion that deposits sediment into the San Pedro River two miles from the pasture boundary. Grass did not exist in sufficient quantity to provide a seed source for the rangeland to recover without additional practice application. The Tucson PMC worked closely with the Willcox Field Office and the Coronado RC&D office to develop a native seed mixture that best represents the potential native plant community. The Tucson PMC continues to work with the Willcox Field Office to collect vegetative data and monitor the progress of this successful planting.

The Tucson PMC is also actively involved with providing technical and on-site assistance to the Caliente, Nevada Field Office, Bureau of Land Management (BLM), the Town of Caliente, Nevada, and the Lincoln County Conservation District. A substantial increase in woody plants in the Clover Creek watershed has led to an increase in streamflow and flooding frequency through the town of Caliente. Controlled burning treatments are conducted by the BLM to reduce the woody species components and open areas for grass and forb establishment. Tucson PMC and Caliente Field Office personnel have initiated a study to evaluate and determine the best adapted seed mixtures, appropriate seeding times,

amounts of seed necessary to effectively establish herbaceous vegetation to reduce soil erosion, downstream sedimentation and flooding, and improve wildlife habitat.

Cooperative Efforts To Manage Noxious Weeds Yield Positive Results

Efforts to evaluate the control and management of noxious weeds are being cooperatively addressed by the Tucson PMC, University of Arizona Cooperative Extension, the Tonto Weed Management Group, and the Arizona Department of Transportation (ADOT). This cooperative effort is currently focusing primarily on yellow starthistle infestations along with a number of other noxious weed species such as Scotch thistle, spotted knapweed, and Dalmatian toadflax. Yellow starthistle originated in the Mediterranean region and Asia. It is a winter annual that spreads exclusively by seed however, it can regrow from a deep taproot when pulled. In Arizona, yellow starthistle is believed to be capable of germinating anytime moisture is adequate and temperatures average around 20 to 25 °C. Seed production varies but one plant can produce up to 150,000 seeds that are both plumed and unplumed, neither of which are highly wind-borne. Up to 95% of yellow starthistle seeds are viable, and 10% may lie dormant in the soil for more than 10 years or until environmental conditions are adequate for germination. Above- and below-ground growth proceeds quickly, which enables yellow starthistle to utilize soil moisture, nutrients, and solar energy before many native plants begin to grow.

In the spring of 2000 a yellow starthistle research project evaluating various suppression methods has been cooperatively established in a heavily infested pasture located in Young, Arizona. Five suppression treatments are being studied along with the establishment of two native warm-season and two native cool-season grass species to act as “suppressors” to compete with the yellow starthistle. Cool-season grasses may directly compete with yellow starthistle seedlings during spring and fall after germination. The warm-season grasses may indirectly compete with yellow starthistle before it germinates by removing soil moisture and nutrients during the summer rain period in Arizona. The initial baseline data for this project was collected in September 2000. This data will help to determine the level of success caused the various suppression treatments.

The 54,000-acre Santa Rita Experimental Range (SRER) was established in 1903 to protect native rangeland from overgrazing and to conduct research on native vegetation, wildlife, and hydrology. It is located about 35 miles south of Tucson in Pima County, Arizona. The land is owned by the State of Arizona and managed by the University of Arizona (UofA) at Tucson.

The Tucson PMC has a long history of involvement on the SRER with the UA and other cooperating agencies. In 1997 the NRCS completed a revision of a soil and range survey on the entire SRER. During the course of this survey a small infestation of Sweet Resin Bush was discovered in the SW

corner of the SRER. The NRCS mapped the extent of the infestation, using GPS, in April 2000.

Sweet Resin Bush is a shrub native to southern Africa and introduced into several areas in Arizona in the 1930's by the Soil Conservation Service and planted by the Civilian Conservation Corps. It has proven to be a highly invasive and noxious plant. In 1998 it was added to the State of Arizona's Noxious Weed List.

An interagency task group (Sweet Resinbush and Karoo Bush Weed Management Group) was formed in southern Arizona to control this shrub before it became a major problem. There are nine known populations of this noxious weed. One large (3,000 acres) population is located near Safford, Arizona and eight smaller populations are located at various locations in southeastern Arizona. An AmeriCorps National Civilian



Community Corps crew was requested in 1998 to assist NRCS, UofA, AZSLD, and USFWS in the initial attack on this plant. February 1999 an AmeriCorps crew was assigned for 2 weeks to the project.

Their activities were primarily grubbing established plants and scouting the area to find and remove scattered populations. They were able to remove approximately 5 acres of an extremely dense area of sweet resin bush – the center of origin for the site. During the remainder of 1999 and 2000 smaller scale control activities were initiated utilizing local troops from the Boy Scouts of America. In the spring of 2001 another AmeriCorp crew was assigned to the project for a period of 2 weeks. Their efforts were focused on scouting the area and removing plants in identified sites. With this effort it is our opinion that the population of sweet resin bush at the SRER is under control. Follow-up efforts are needed over the next 5 years to scout the area for new populations and any individuals that were missed during the 2001 control effort.

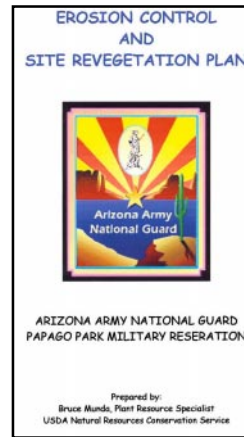
Irrigated Pasture Management Workshops Help Define Proper Management And Increase Forage Production

In May 2000 the Tucson PMC participated in two irrigated pasture management workshops in Santa Cruz County, Arizona. Proper species selection, pasture and irrigation water management is extremely important when developing and maintaining a viable, productive irrigated pasture in our arid environment. Irrigated pasture provides forage for livestock, is beneficial during breeding and calving periods, serves as an exercise area for horses, and most importantly serves to protect soil and reduce offsite sediment deposition.

The Tucson PMC has been working with the Tucson and Willcox Field Offices and the University of Arizona

Cooperative Extension Service to identify additional plant species for use in irrigated pastures as well as promote proper irrigated pasture management through educational workshops for landowners and NRCS employees. A cooperative project with the Santa Cruz County Cooperative Extension Service, a local landowner, and the Tucson PMC was initiated in August 2000 to evaluate seven warm-season grass species for their potential use in irrigated pasture systems in southeastern Arizona.

Technical Assistance Benefits Arizona Army National Guard



On November 18, 1998 the Natural Resources Conservation Service entered into a formal agreement with the Arizona Department of Emergency and Military Affairs, and the Arizona Army National Guard (AZ ARNG). The intent of the agreement is to provide the AZ ARNG an Erosion Control and Site Revegetation Plan for Papago Park Military Reservation at Phoenix Arizona. The Plan will be used to identify strategies to conserve, improve, and sustain the natural resources at Papago Park. The Plan

specifically addresses visual screening, wildlife enhancement, erosion control, and dust control.

The Tucson PMC with assistance of personnel from the local field office and the Resource Support Team developed the comprehensive Erosion Control and Site Revegetation Plan. The final document included the following components:

- Detailed Soil Map with use interpretations that will serve as the base for recommendations as well as future planning the ARNG may undertake.
- Inventory of plant species currently present on the site and species adapted to the site.
- Recommended re-vegetation strategies with locations detailed on a site map.
- Evaluation of sites in relation to wildlife habitat including standards, specifications, and recommended strategies to protect and enhance specific wildlife species present and/or adapted to the existing environment.
- Recommendations related to construction of engineered conservation practices to protect the site against undo erosion with locations detailed on a site map.

All recommended construction practices include identified locations, standards, specifications, and estimated materials/costs lists.

To learn more about these and other PMC activities visit our website at:

Plant-Materials.nrcs.usda.gov